UNITED STATES SPECIAL OPERATIONS COMMAND

Proposal Submission

The United States Operations Command's (USSOCOM) mission includes developing and acquiring unique special operations forces (SOF) equipment, material, supplies and services. Desired SOF operational characteristics for systems, equipment and supplies include: lightweight and micro-sized; reduced signature/low observable; built-in survivability; modular, rugged, reliable, maintainable and simplistic; operable in extreme temperature environments; water depth and atmosphere pressure proof; transportable by aircraft, ship and submarine, and deployable by airdrop; LLPI/LPD jam resistant C3I, electronic warfare capable of disruption and deception; near real-time surveillance, intelligence and mission planning; highly lethal and destructive; low energy/power requirements; and compatible with conventional force systems.

USSOCOM is seeking small businesses with a strong research and development capability and an understanding of the SOF operational characteristics. The topics represent a portion of the problems encountered by SOF in fulfilling its mission.

Inquires of a general nature or questions concerning the administration of the SBIR program should be addressed to:

United States Special Operations Command
Attn: SOAL-KS/Ms. Karen L. Pera
7701 Tampa Point Blvd.
MacDill Air Force Base, Florida 33621
Email: perak@socom.mil

USSOCOM has identified technical topics for the FY '01.2 solicitation and proposals will only be accepted for those topics. The USSOCOM Program Executive Officers (PEOs) responsible for the research and development in these specific areas initiated the topics. The same office is responsible for the technical evaluation of the proposals. Proposal evaluation factors are listed below. Each proposal must address each factor in order to be considered for an award. Scientific and technical information assistance may be requested by using the DTIC SBIR Interactive Technical Information System (SITIS).

The maximum amount of SBIR funding for a USSOCOM Phase I award is $100,000 and the maximum time frame for a Phase I is 6 months. Phase I proposals less than 6 months and/or less than $100,000 and are encouraged where low risk technologies are being proposed. SOCOM Phase II proposals must be structured as follows: the first 10-12 months (base effort) should be approximately $375,000; the second 10-12 months (option) of incremental funding should also be approximately $375,000. Phase II proposals less than 24 months and/or less than $750,000 are encouraged. The maximum amount of SBIR funding for a USSOCOM Phase II award is $750,000 and the maximum time frame for a Phase II is 24 months. Proposals should be based on realistic cost and time estimates, not on the maximum time (months) and dollars. The cost of the project is based on the overall amount of hours spent to accomplish the work required and the overall term of the project should also be based on the same effort. In preparing their proposals and plan of objectives and milestones, firms should consider that workload and operational tempo precludes extensive access to government and military personnel beyond established periodic reviews.

Evaluation Criteria – Phase I & II

1) The soundness, technical merit, and innovation of the proposed approach and its incremental progress toward topic or subtopic solution.

2) The qualifications of the proposed principal/key investigators supporting staff, and consultants. Qualifications include not only the ability to perform the research and development but also the ability to commercialize the results.

3) The potential for commercial (Government of private sector) application and the benefits expected to accrue from this commercialization.

Selection of proposals for funding is based upon technical merit and the evaluation criteria included in the solicitation. As funding is limited, USSOCOM will select and fund only those proposals considered to be superior in overall technical quality and most critical. USSOCOM may fund more than one proposal in a specific topic area if the technical quality of the proposals are deemed superior, or it may fund no proposals in a topic area.

Electronic Submission Instructions

All proposal information must be received electronically via the DoD SBIR/STTR Submission site. To submit, proceed to http://www.dodsbir.net/submission. Once your firm has been registered, they may prepare (and edit) Company Commercialization Report Data, prepare (and edit) Proposal Cover Sheets(s) (formerly referred to as Appendix A and B), complete the Cost Proposal form, and upload corresponding Technical Proposal(s). Electronic proposals will be submitted by 3:00PM EST on August 15, 2001. The submission, exclusive of the Company Commercialization Report, may not exceed 25 pages.

Paper copies will not be considered. A complete electronic submission is required for proposal evaluation. Proposal evaluation will be accomplished via a secure web site. Please call your nearest Electronic Commerce Regional Center for assistance in uploading proposals. Please note that there have been problems in the past with AOL uploads due to their system, therefore strongly suggest an alternate internet service provider (ISP) for files larger than 5MB. It is strongly suggested you submit your proposal 3-5 days prior to closing date to ensure complete submission. Proposers are responsible for complete submission.

Refer to the on-line help area of the DoD SBIR/STTR Submission site for questions, troubleshooting, etc. For further assistance, contact the help desk at SBIRHELPDESK@pbcinc.com or 1-866-216-4095.

USSOCOM offers information on the Internet about its SBIR program at http://www.socom.mil and http://www.acq.osd.mil/sadbu/sbir.

Electronic Technical Proposal Upload

The term “Technical Proposal” refers to the part of the submission as described in Section 3 of the Solicitation. WordPerfect, Text, and MS Word are the preferred formats for proposal submissions. You are encouraged, but not required, to embed graphics within the document. When including images, care should be taken to ensure images are not of excessive size. A resolution of 200 dpi or below is requested for all embedded images. Please use standard fonts in order to prevent conversion difficulties. An overall file size of 5MB or less is recommended for each electronic proposal submission.

You will receive a confirmation page via the submission site once the proposal has been uploaded. The upload will be available for viewing on the DoD SBIR/STTR Submission site within 24 hours. It is within your best interest to review the upload to ensure the server received the complete file. Questions or problems should be directed to the help desk as mentioned above.

You are responsible for performing a virus check on each proposal to be uploaded electronically. The detection of a virus on any submitted electronic technical proposal may be cause for the rejection of the proposal. USSOCOM will not accept e-mail submissions. You should contact your Internet Service Providers to if you have questions concerning the provider’s file size transmission allowance.

PRE-RELEASE TOPIC AUTHOR FILE:

The Technical Point of Contact (TPOC) for general technical questions about the SOCOM SBIR topics, contact Dave Saren at the following address:

USSOCOM/SOAL-T
Attn: Dave Saren
7701 Tampa Point Blvd.
MacDill AFB, FL 33621
(813) 828-9363
Email: sarend@socom.mil

SOCOM 01-005 TITLE: Remote Runway Survey System to Measure Soil Type, Load Bearing Capacity, Slope and Grades

TECHNOLOGY AREAS: Sensors

OBJECTIVE: Design and build a lightweight, portable, runway survey system that can be deployed remotely, function unattended, and is capable of transmitting data to a remote operations center. The purpose is to determine if a segment of property is suitable for use as an aircraft runway or military drop zone.

DESCRIPTION: Recent advances in imbedded computers, direct and remote sensing devices, video cameras, remote soil samplers, robotics, communications and related technologies make remote soil sampling and dimensions measurement for assault zone suitability possible. Assault zones include landing zones for fixed and rotary-wing aircraft and drop zones for troops and equipment. The Air Force surveys these areas on a regular basis to physically measure assault zone characteristics: physical dimensions, magnetic orientation, coordinates, obstacles, elevation, weight-bearing capacity of the soil (California Bearing Ratio/Airfield Index), soil composition, terminal navigation aid suitability, etc. Air Force Special Tactics operators need to take precise measurements compromising their safety or otherwise drawing attention to their activity in non-permissive or denied areas. Of particular importance is establishing the strength of the soil, in terms of the Airfield Index (AI), to correlate aircraft performance to calculated AIs. Because soils vary in type and condition from site to site, and by season, there is a direct relationship between AI, aircraft performance, and operational capability. For this reason, site measurements must be accurate, and repeated as soil conditions change. Physical measurements for assault zones must be taken without detection. The weight-bearing capacity of the soil along and throughout the entire site must be measured without physically disturbing the site. Along with load bearing measurements, measurements of width, length, elevation, slope gradients, and lateral and longitudinal obstacle clearances of the runway or drop zone, correlated with ground coordinates, are required. True magnetic bearing must be provided, and an evaluation of best siting locations for navigation aids, autonomously or from previously entered data must be made. Measurements for drop zones do not require extensive soil load bearing measurements. All this data must be stored and transmitted to a remote site.

Sensors/capabilities that apply include:
* Space Based Imagery as a first quantifier of where suitable runways and drop zones might be placed. Applicable research includes:
* Ground Penetrating Radar that might be useful in measuring soil density and calculating load bearing qualities.
* Dynamic Cone Penetrometer
* Push probe sensors
* Inclinometer and GPS
* Imagery sensor
* Still frame or video sensor to beam back pictures of obstacles

PHASE I: A lightweight low-cost, perhaps disposable, solution to providing the described capabilities is required. Define and design a system with the capability to traverse an assault zone, measure soil characteristics, calculate load bearing capacity for large military aircraft, and measure the physical dimensions of the assault zone, including property slope and magnetic orientation. The design shall include a communications capability compatible with a military approved frequency and that uses standard modulation.

PHASE II: Prototype the system and demonstrate its capability to meet the requirement in an operationally realistic environment. Conduct testing to prove feasibility over extended operating conditions.

PHASE III DUAL-USE APPLICATIONS: This system could be used in a broad range of military and civilian applications where load bearing capabilities of soil and surface slope are important. Airport, road, and building construction projects could benefit immediately from this capability.

REFERENCES:

1. White Paper, Identifying Unprepared Landing Sites for Advanced Theater Transport Aircraft (and Terrain Trafficability for Military Vehicles), Mr. Dave Manley, The Boeing Company, Advanced Theater Transport Program Manager, 2401 E. Wardlow Road, Long Beach, CA 90807-5308, (562) 982-2156

2. Opportune Landing Sites, Bowling Green State University, Geology Department, Bowling Green, OH, 43403

3. Micropower Impulse Radar, MIR Program Office, c/o JoAnn Frost, Lawrence Livermore National Laboratory, P.O. Box 808 L-290, Livermore, CA 94551, Telephone: (925) 423-1077, Fax: (925) 422-3358, E-mail: frost4@llnl.gov
4. Automated Dynamic Cone Penetrometer, Vertek Manufacturing, RR1, Box 120A, Waterman Road, South Royalton VT 05068. (800) 693-6315

5. Air Force Civil Engineer Support Agency, Tyndall AFB, FL, http://www.afcesa.af.mil/

6. Push Probe, EPA SBIR Contract Number: 68D00271, Integrated Downhole Gas Chromatograph and Automated Sampler for Direct Push, Dr. Michael Dvorak, Dakota Technologies, Inc., 2201-A 12th Street, North Fargo, ND, 58102-1803. Telephone Number: (701) 237-4908

7. Micro Push Probes: NASA has several programs, but specific references are unknown.

8. Remote soil sampling vehicles: NASA, Rocky 7 and SOJOURNER, http://mpfwww.arc.nasa.gov/tasks/scirover/factsheet/homepage.html
a) American Society of Testing and Materials (ASTM) D1633. Compression Strength of Molded Soils Cementing Cylinders. 1990. b) FM 5-430-00-2/AFP 93-4. Volume II. Planning and Design of Roads, Airfields, and Heliports in the Theater of Operations: Airfield and Heliport Design.

9. American Society of Testing and Materials (ASTM) D1633. Compression Strength of Molded Soils Cementing Cylinders. 1990. b) FM 5-430-00-2/AFP 93-4. Volume II. Planning and Design of Roads, Airfields, and Heliports in the Theater of Operations: Airfield and Heliport Design.

KEYWORDS: Sensors, robotics, remote measurement, communications, vision system, pattern analysis

SOCOM 01-006 TITLE: SOF Tactical Information Assistant

TECHNOLOGY AREAS: Information Systems

Objective: The goal of this program is to enhance personal and/or team performance through the use of tactical information assistants. The approach is to seek innovative technology ideas that offer significant added value to current practice and that can be embedded into portable tactical systems that are safe, reliable and economical. This SBIR will design and build rugged, inexpensive portable tactical display units for deployed SOF personnel.

The SOF Tactical Information Display (STID) could be adapted from commercial products. Two different types are desired; one head-mounted, the other wrist-mounted. These tactical information displays will be used to provide graphical and alphanumerical information transmitted from the PDA or any computer using wireless methods. STIDs will be small, portable, electronic displays that provide individual users or teams with application specific information to enhance their mission success. Predictions from commercial electronic articles (Electronics Design, Oct 16, 2000) indicate that in ten years head or wrist mounted displays will be standard throughout society. There is a strong emphasis on the use of displays (direct view or head mounted) to present information in a visual form.

As indicated above, two versions of the STID are desired; one head-mounted, the other wrist-mounted. These will provide the soldier with hands free information. Both will use low power wireless technology (such as "Bluetooth") to receive video signals from a SOF operator’s computer or the PDA described in this SBIR. Both STIDs will basically be a “remote” display, similar to a computer monitor.

The head mounted STID will take the form of eyeglasses and/or a helmet mounted display. It will have the following requirements: SVGA resolution, 32 degree viewing angle, 32k colors, 60 frames/sec refresh rate, 1W power consumption, contain a rechargeable battery that will last a minimum of 6 hours, and have an external DC input (to run with an external power source and/or charge the internal battery). Objectives are XVGA resolution, less than .5W power consumption, and a rechargeable battery that will last 12 hours.

The wrist-mounted STID will be a high resolution, low power display. The displays will have adjustable luminance, from off (dark) to bright enough to be seen in bright sunlight. It will have a requirement of SVGA resolution, 1W power consumption, 32k colors, contain a rechargeable battery that will last a minimum of 6 hours, and have an external DC input (to run with an external power source and/or charge the internal battery). Objectives are XVGA resolution, less than .5W power consumption, and a rechargeable battery that will last 12 hours.

A wireless transmitter to communicate from the computer to the STID will be designed and built and packaged into a very small box that would connect directly to a port of the computer or PDA (e.g. VGA port). Software will be written if needed to allow the operator to quickly configure what data will be passed to his STID. The transmitter and STID will not have to communicate from a distance greater than 10 feet; will be low power and not be detectable at a distance of more than 50 feet.

The STIDs must be able to survive and correctly operate after being submersed at depths of two (2) atmospheres for three (3) hours, parachuted from altitudes of up to 20,000 feet, transported by air at altitudes up to 40,000 feet, and exposed to temperature extremes -20* to +70* C for extended periods.

PHASE I: Perform a study to evaluate current commercial display technologies, head-mounted and wrist-mounted display configurations, and software that could fulfill the above requirements. The study should emphasize the best display at the lowest power consumption. Develop design for Phase II.

PHASE II: Design and build, or modify existing COTS hardware/software to perform and/or support the desired functions. Build two of each head-mounted and wrist-mounted STIDs. Conduct extensive user acceptance testing that demonstrates data and environmental compliance and successful performance of desired functions.

PHASE III DUAL-USE APPLICATIONS: The STID will have a wide appeal within the commercial sector and could be used effectively by a vast portion of military, civilian law enforcement and emergency services, as well as construction firms, the trucking industry, and other industries such as taxi companies. The STID would provide a high-resolution video interface for cellular telephones, other Personal Digital Assistants, as well as military, police, and emergency radios. These displays would permit users to view transmitted maps, location data, pictures, messages, and full motion video. It could also interface with portable CD-ROM or DVD drives to display maps, charts, pictures, full motion video, etc. It could have wide civilian applications.

KEYWORDS: Display, Portable, Wireless, Head-Mounted, Wrist-Mounted, SVGA, VGA, XVGA, Video, STID, Personal Digital Assistant

SOCOM 01-007 TITLE: <u>Tactical Body Worn RF Antenna Vest</u>

TECHNOLOGY AREAS: Sensors

OBJECTIVE: Design and build a rugged tactical body worn radio frequency (RF) receiving antenna to provide threat warning to deployed Special Operation Forces (SOF) missions. The design should use the latest antenna technologies including fractals, patch, composites, conductible cloth, etc., to design a body worn antenna that will receive frequencies from 100MHz to 1GHz (threshold), with the objective of receiving 2MHz to 40GHz. Note, the RF band from 2-40GHz does not have to be continuous coverage, only coverage for bands of known radar emitters.

DESCRIPTION: Today SOF Tactical users normally must stop moving and setup equipment to perform RF detection. This limits their effectiveness to other team members. Our goal in the next generation is to permit on the move hands free RF detection.

We envision the SOF user attaching a receiver and a power source onto his belt or in his backpack, then connecting the receiver via a flexible coaxial cable at a single point on the vest.

The objective will be to design the antenna into common existing SOF tactical web gear or protective vest. The vest can contain a variety of antennas, with the RF combining into a single output that will meet frequency range, VSWR, and directional requirements. Plans should be made for the antenna to pass the RF frequencies to the radio and the radio to pass DC power to the antenna using this single connection. The antennas must take into account multiple possible positions including standing and prone.

We have a requirement for the vest to contain an omni-directional antenna, and an objective that the vest also contain a directional antenna and/or direction finding (DF) antenna.

The omni-directional antenna will have uniform gain (within 3dB) in all directions. It will have a VSWR less than 1.2:1 across the frequency band, with an objective of 1.1:1.

The DF antenna will be composed of at least 8 antennas covering the HF through UHF range, evenly spaced around the soldier. A DF algorithm will be designed to process the signals to determine the location of the signal source. The bidder need not be an expert in DF; SPAWAR Systems Charleston, who is the builder of the receiver that will integrate with the antenna, will assist.

The directional antenna will have at least 6dBi gain forward, and at least 3dBi rejection all other directions. The directional antenna will be placed on the front of the vest (and hence the operator). We envision the directional antenna being composed of multiple antennas, that when combined, covers the required frequency range, and with a ground plane behind the antennas to give directionality.

The vest should contain a small, low power, high dynamic range preamplifier(s) for the LVHF band and above that can be turned on and off, and powered through the RF connection.

Operationally, we envision a tactical user walking along with his team, a receiver on his belt, using the omni-antenna to detect RF energy. When a threat is detected, the SOF user can then change to the DF antenna to locate the direction of the source of the transmission. If the signal is weak, he could then press a button/switch on the vest, and switch to the directional antenna and orient himself to maximize the signal level.

Successful proposals will use novel technology to achieve substantial enhancements to equipment size, weight, performance, reliability, power consumption and/or cost.

PHASE I: Research antenna types that can meet the above objectives and requirements. Develop system design after interaction with SOF tactical users that specifies frequency coverage, antenna types and placement, and DF technology to be used. A decision during Phase 1 will be made on whether to include a directional and/or DF antenna. In addition, research and study the effects (e.g. health) of placing a transmitting antenna in this vest, or using the omni-directional antenna to transmit.

PHASE II: Develop system prototypes (2) and perform antenna gain and VSWR testing. Demonstrate in a realistic tactical environment. Conduct limited testing to prove feasibility over a seven-day mission scenario. Conduct environmental testing to determine feasibility of swimming at a 30-foot depth and subsequent successful operation on the beach and dry land.

PHASE III DUAL-USE TECHNOLOGIES: This system is designed primarily for SOF tactical operations, but will have application with the other military services and law enforcement agencies. Already, Army (Ft. Huachuca) has expressed interest in this SBIR.

KEYWORDS: RF, radio frequency, body worn, antenna, tactical, vest.

SOCOM 01–008 TITLE: <u>NBC Personnel Cooling Suit</u>

TECHNOLOGY AREAS: Chemical/Biological Defense; Human Systems

OBJECTIVE: Design, build and test a lightweight man portable cooling system for use by SOF operators wearing NBC protective clothing. The system shall provide a lightweight self-contained capability to cool the individual operator for a specified duration.

DESCRIPTION: Various new technologies (super cooled liquid air, dry ice, micro cooling, etc.) for personnel cooling have been recently demonstrated. Cooling mechanisms can be passive (evaporative) or active (mechanical). Cooling mediums range from gaseous to liquid cooling mediums. This effort would leverage these existing cooling technologies to develop an innovative cooling system for dismounted personnel applications. The current lack of personnel cooling is the limiting factor for operational endurance when wearing NBC protective garments. Current NBC protective garments subject the users to a significant heat stress burden, limiting their operational effectiveness. In lieu of replacing NBC protective garments, a personnel cooling system will extend the operational effectiveness of the SOF operator. The need for personnel cooling is currently the highest priority for SOF operators in an NBC environment.

PHASE I: Demonstrate an active or passive personnel cooling system concept that provides a minimal cooling capability of 500 watts at a light weight (<15 lb) with a 2 hr duration.

PHASE II: Optimize the Phase I design for operational considerations and demonstrate a personnel cooling system that provides a minimum cooling capability of 500 watts at a lighter weight (<12 lb.) with an improved duration (4 hours +). Additional design considerations include attitude independent operation, shock proof, hardened, air tight, water tight, quick disconnect to suits & supply, check valves at suit penetrators to preclude coolant fluid drainage, and an emergency breakaway disconnect (10 lb.).

PHASE III DUAL USE APPLICATIONS: This system could be used for civilian fire fighting applications and emergency response units upon National Fire Protection Association (NFPA) certification.

SOCOM 01-009 TITLE: Seat/Bolster/Other "New" Approach for Personnel Transport on Special Operations Forces (SOF) Maritime Combatant Craft

TECHNOLOGY AREAS: Ground/Sea Vehicles; Human Systems

TITLE: Shock mitigating, ergonomic seat/bolster for personnel transport on Special Operations Forces (SOF) Maritime Combatant Craft. Priority is to develop an ergonomically correct seat/bolster to provide maximum protection to the human musculoskeletal system of the SOF operator from the injurious and/or debilitating effect(s) caused by chronic exposure to severe and repeated mechanical shock (RMS).

OBJECTIVE: Design and build a seat/bolster. which places the SOF operator in the optimum ergonomic position and integrates shock mitigating technology. The seating system must be adjustable to accomadate the 5 to 95 percentile person. The mitigating technology must have an un-damped natural frequency of 1-3 Hz with the inclusion of a damper to provide critical damping. The seat/bolster must fit within current SOF Combatant Craft without effecting craft performance or interfering with the operator's duties.

DESCRIPTION: United States Special Operations Command is responsible for the safe and effective operation of maritime craft used by SOF Forces. In the surface application, these are planing hulls that range from 36 to 82 feet in length. Crew and other embarked SOF Personnel, in typical scenarios, are subjected to mission profiles involving at-sea periods of up to 500 miles and lasting as long as 24 hours. As such, they are subjected to the short term debilitating impact and the long-term injurious prospects associated with prolonged exposure to the effects of RMS.

SOF Combatant Craft are tasked to deliver SOF operators in support of the conduct of their mission. Once the mission is complete, the craft retrieves the operators for return to "base." In the simplest of terms, the combatant craft is a bus for other SOF operators. The physical and mental condition of those SOF operators, when the bus delivers them for mission execution, is of critical importance. This also applies to the supporting crewmen.

SOF Combatant Craft are becoming ever faster. Combined with combatant craft crewmen (NEC 5352) now being able to spend their entire career(s) at the Special Boat Units (SBUs), that has exacerbated significantly a historic medical problem: personnel injury from sustained Combatant Craft OPS. Higher-speed boats have greater accelerations that cause more/severer injuries than slower boats. Personnel can now spend a career with the SBUs; translates over the longer period into enduring more of those higher accelerations.

Craft now have rigid bolster seat arrangements for personnel transport. SBIR purpose is development (and/or identification) of an alternative that is a significant improvement from the current bolster seats' ability to mitigate RMS effects on personnel.

PHASE I: Develop overall system design to include specification of technological approach.

PHASE II: Develop and demonstrate a prototype system in a realistic environment. Conduct testing to prove feasibility over extended operating conditions.

PHASE III DUAL-USE APPLICATIONS: This system could be used in a broad range of military and civilian applications. Specifically, potential application includes all people going by boat to open water for/over lengthy periods of time. System would mitigate injurious and/or debilitating effect(s) caused by chronic exposure to severe and repeated mechanical shock (RMS).

KEYWORDS: Shock, Mechanical, Hydraulic, Electric,